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VI

**PLIOCENE DEPOSITS NORTH OF SIMI  
VALLEY, CALIFORNIA**

BY

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The youngest Tertiary rocks on the south slope of the Santa Susana Mountains north of Simi Valley, in eastern Ventura and western Los Angeles counties, consist of sandstones and conglomerates that lie unconformably on beds ranging in age from upper Miocene to Eocene. Though they are the youngest consolidated deposits in this region, they embrace rocks that are far harder than any of the other Tertiary rocks; they cap high ridges and supply the most durable rock waste to the streams.

These beds, which are several hundred feet thick in the eastern part of the area described and thicken westward, were described by Kew,<sup>1</sup> who referred them to the Fernando formation and on the basis of a collection of fossils from "Browns Canyon below the abandoned wells" recognized their Pliocene

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<sup>1</sup>Kew, W. S. W., Structure and oil resources of the Simi Valley, southern California: U. S. Geol. Survey Bull. 691, pp. 333-334, 1919.

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age and that they are younger than the Pliocene beds of Elsmere Canyon near Newhall. Later Kew<sup>2</sup> referred these deposits to the Saugus formation and listed a few fossils from additional localities in this region.

These Pliocene beds were examined during the course of work carried on by the 1929 summer field camp of the California Institute of Technology by parties headed by F. D. Bode, J. W. Daly, W. A. Findlay, K. E. Lohman, and G. F. Taylor. Any credit for the additional information discovered belongs to these students and their collaborators, who performed the arduous work of mapping and fossil-collecting. Not enough time was spent on this part of the Tertiary section to yield precise stratigraphic results in the way of measurements and possible subdivisions. These matters are now being investigated by G. H. Anderson, of the California Institute of Technology. The fossils collected during the work of the summer field camp confirm Kew's original age assignment and show that at least the lower part of these beds falls within a division of the Pliocene series that furnishes a readily recognized datum horizon in southern California. The fossils and the localities where they were collected are as follows:

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<sup>2</sup>Kew, W. S. W., *Geology and oil resources of a part of Los Angeles and Ventura counties California*: U. S. Geol. Survey Bull. 753, pp. 69-70, 81-89, 1924.

*Pliocene fossils from localities north of Simi Valley*

	433	435	434	457	436	440	445	437	441	446	439	442	451	447	438	450	448
Lamellibranchs:																	
<i>Ostrea vespertina</i> Conrad.....	×			×	×			×		×		×				×	
<i>Pecten bellus</i> hemphilli Dall.....	×			×											×	×	
<i>Pecten stearnsii</i> Dall.....		×															
"Pecten" <i>healeyi</i> Arnold.....																	
"Pecten" <i>cerrosensis</i> Gabb <sup>3</sup> .....																	
"Pecten" <i>veatchii</i> Gabb.....																	
"Pecten" <i>purpuratus</i> Lamarck, var. <sup>3</sup> .....		×															
"Pecten" <i>invalidus</i> Hanna? <sup>3</sup> .....																	
"Pecten" <i>latauritus</i> Conrad?.....																	
<i>Chlamys hastatus</i> (Sowerby).....																	
<i>Chlamys opuntia</i> (Dall).....																	
<i>Chlamys swiftii</i> parmelei (Dall).....																	
<i>Monia macroschisma</i> (Deshayes).....																	
<i>Modiolus rectus</i> (Conrad)?.....																	
* <i>Lithophaga</i> .....																	
* <i>Cardita ventricosa</i> Gould?.....																	
* <i>Miltha</i> cf. <i>xantusi</i> (Dall).....																	
*"Cardium"?.....																	
Echinoids:																	
<i>Strongylocentrotus</i> cf. <i>franciscanus</i> (A. Agassiz).....																	
<i>Dentrastra diegoensis</i> Kew?.....																	
<i>Dentrastra cedrosensis</i> Israelsky.....																	

<sup>3</sup>I am indebted to Dr. H. R. Gale for pointing out the names to be used for these species.

\*Specimens represented by molds.

## Pliocene fossils from localities north of Simi Valley—Continued

	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448
Bryozoa:																
Cauloramphus . . . . .																
Smitina . . . . .					×											
Brachiopod:																
Dallinella occidentalis (Dall) . . . . .			×							×						
Gastropods:																
*Astraea? . . . . .																×
*Calliostoma . . . . .																
*Odostomia? . . . . .																×
*Eptonium fallaciosum Dall? . . . . .																
Opalia varicostata Stearns . . . . .																
*Neverita cf. reclusiana (Deshayes) . . . . .																
*Bittium . . . . .																
Forrera wrighti Jordan and Hertlein? . . . . .																
*Mitrella . . . . .																
*Nassarus . . . . .																
*Neptunea? . . . . .																
*Conus californicus Hinds? . . . . .																
*Acteon . . . . .																

\*Specimens represented by molds.

*California Institute of Technology locality numbers*

433. East of Aliso Canyon, cliff at end of road near center of sec. 36, T. 3 N., R. 17 W.; 7400 feet N. 58° E. from Rocky Peak. G. F. Taylor.
435. East of Aliso Canyon, south line of sec. 25, T. 3 N., R. 17 W.; on northward-facing cliff in burned-over area, 7650 feet N. 45½° E. from Rocky Peak. J. W. Daly.
434. Spur east of Aliso Canyon, western part of sec. 36, T. 3 N., R. 17 W.; 30 feet above fault contact with Eocene, 6800 feet N. 64½° E. from Rocky Peak. J. W. Daly.
457. West of Aliso Canyon, east slope of ridge near center of sec. 26, T. 3 N. R. 17 W., 8800 feet N. 12½° E. from Rocky Peak. G. F. Taylor.
436. West side of Las Lajas Canyon, about 100 feet below top of cliff section, 2750 feet N. 68° E. from 2205-Hill. W. A. Findlay and J. Reilly.
440. Same locality as 436, but about 75 feet below top of cliff section. W. A. Findlay and J. Reilly.
445. Same locality as 436, immediately below lowermost conglomerate in cliff section. W. A. Findlay and W. P. Woodring.
437. On ridge between forks of first canyon west of Las Lajas Canyon, 5950 feet N. 27½° E. from 2205-Hill. W. A. Findlay and J. Reilly.
441. East of Dry Canyon, 5500 feet N. 36° W. from 2205-Hill. W. A. Findlay.
446. East of Dry Canyon, 4550 feet N. 36½° W. from 2205-Hill. J. Reilly.
439. East of Dry Canyon, 5200 feet N. 39° W. from 2205-Hill. J. Reilly.
442. East side of Dry Canyon near top of ridge, 7000 feet N. 45° W. from 2205-Hill. W. A. Findlay and J. Reilly.
451. East of Dry Canyon, south slope of 2075-Hill, peak of which is 1650 feet N. 79° W. K. E. Lohman and W. B. Maitland.
447. East of Dry Canyon, south slope of 2075-Hill, peak of which is 950 feet S. 54° E. K. E. Lohman and W. B. Maitland.
438. West side of main branch of Dry Canyon, 2000 feet N. 58½° W. from 2075-Hill. K. E. Lohman and W. B. Maitland.
450. West side of main branch of Dry Canyon, 2100 feet N. 54½° W. from 2075-Hill. K. E. Lohman and W. B. Maitland.
448. Main branch of Tapo Canyon, road cut about 30 feet north of pumping plant, 450 feet S. 40½° W. from 1794-Hill. K. E. Lohman and W. B. Maitland.

It is apparent from the preceding list that these fossils represent a warm-water Pliocene fauna, which has been found at localities from Lower California northward to the Ventura Basin and which is best known as the fauna of the San Diego formation. "*Pecten*" *veatchii* Gabb, a tropical *Nodipecten* described from Cedros ("Cerros") Island, Lower California, heretofore has not been recorded so far north. Many other

species in this list are found in the Pliocene deposits of Cedros Island<sup>4</sup> and at San Diego. So far as I know the only locality around the borders of the Los Angeles Basin where this fauna is found is near the mouth of Temescal Canyon northwest of Santa Monica where the following fossils were collected:

*Pliocene fossils from Temescal Canyon*

55. West side of Temescal Canyon, 200 yards above mouth, massive gray sandstone. H. W. Hoots and W. P. Woodring.

Brachiopod:

*Dallinella occidentalis* (Dall)

Gastropod:

*Opalia varicostata* Stearns

Lamellibranchs:

*Ostrea vespertina* Conrad

*Pecten bellus* hemphilli Dall?

*Pecten stearnsii* Dall

"Pecten" *healeyi* Arnold

"Pecten" *cerrosensis* Gabb

"Pecten" *purpuratus* Lamarck var.

*Chlamys hastatus* (Sowerby)

*Chlamys opuntia* (Dall)

*Chlamys swiftii parmeleei* (Dall)

\**Phacoides annulatus* (Reeve)?

\**Miltha* cf. *xantusi* (Dall)

\*Specimens represented by molds.

The San Diego affinities of the fossils from this locality were recognized by Arnold.<sup>5</sup> The similarity of this small fauna to that found at many localities north of SimiValley is striking, and it is quite clear that the same faunal zone is represented. There are not many Pliocene faunal zones in southern California that can be so definitely recognized at such widely separated localities and the beds constituting this zone should have a uniform stratigraphic nomenclature. The deposits north of Simi Valley certainly should not be called the Saugus formation, at least not until it is conclusively shown that the type nonmarine Saugus formation grades laterally into this zone. The name Saugus formation has been used as a catch-all for almost any Pliocene and Pleistocene beds in the

<sup>4</sup>See Jordan, E. K., and Hertlein, L. G., Proc. Calif. Acad. Sci., 4th ser., vol. 15, no. 14, 1926, pp. 409-464.

<sup>5</sup>Arnold, Ralph, New and characteristic species of fossil mollusks from the oil-bearing Tertiary formations of Southern California: Proc. U. S. Nat. Mus., vol. 32, p. 527, 1907.

Ventura and Los Angeles basins. In the Las Posas Hills, not more than 15 miles southwest of Simi Valley, the so-called Saugus formation consists of a lower part carrying a cool-water upper Pliocene fauna and an upper part carrying a warm-water, presumably interglacial, Pleistocene fauna, according to Pressler's account.<sup>6</sup> For the Pleistocene beds Pressler proposed the name Las Posas formation. As Pressler surmised, the beds referred to the Saugus formation north of Simi Valley are older than any part of the Las Posas Hills section. The cross-bedded sands and gravels that are well exposed on the Grimes Canyon road, northwest of Simi Valley, probably represent the landward edge of the Las Posas formation.<sup>7</sup> These beds constitute the upper division of the Saugus formation of this region as described by Kew.<sup>8</sup> By tracing westward from the region north of Simi Valley the beds carrying the fauna of the San Diego formation it should be possible to determine the relations of the Pliocene and Pleistocene parts of the so-called Saugus formation.

Beds carrying a San Diego fauna could be given a new name in each basin, which would complicate an already cumbersome nomenclature; they could be called the San Diego formation regardless of where they are found, just as deposits of Paleocene age in California are referred to the Martinez formation wherever they are found; or a zonal nomenclature could be adopted and they could be referred to as the *healeyi*-zone (after "*Pecten*" *healeyi*), or by some other fossil name that would instantly bring to mind the San Diego fauna. The latter course seems to be the preferable one, for it would yield a definite meaning. Whether the San Diego formation and equivalent deposits elsewhere are called middle Pliocene or upper Pliocene depends on where the Pliocene-Pleistocene boundary is placed. H. R. Gale and U. S. Grant IV, of Stanford University, who are completing a study of the Pliocene and Pleistocene of southern California, consider these deposits middle Pliocene.

The fossils collected north of Simi Valley and in Temescal Canyon represent only a small fraction of the fauna living

<sup>6</sup>Pressler, E. D., The Fernando group in the Las Posas-South Mountain District, Ventura County, California: Univ. Calif. Bull. Dept. Geol. Sci., vol. 18, No. 13, pp. 325-345, 4 figs., 1929.

<sup>7</sup>Idem, p. 344.

<sup>8</sup>U. S. Geol. Survey Bull. 753, p. 85, 1924.

when these beds were laid down and the question arises as to the significance of the presence of a few things and the absence of many. The solution seems to be relatively simple and to involve nothing more subtle than the composition of the fossil remains. Virtually the only shells and tests that are preserved intact are those that are composed of calcite; that is, brachiopods, echinoids, oysters and Pectens among the lamelli-branches, and Epitonids among the gastropods. One of the Epitonids (locality 445) is badly leached, but the Opalids are perfectly preserved. The host of mollusks with less durable aragonite shells are not represented at all or are sparsely represented at a few places by impressions and molds, to which some of the shell may still be attached, with the exception of the *Forreria*, which consists of a shell fragment, and the *Monia*, which is perfectly preserved aside from the loss of the inner nacreous layer. The collections consist principally of a monotonous repetition of oysters, which are the most abundant fossils, and Pectens, of which there is a surprising number of species, with an addition of brachiopods and echinoids here and there. In Temescal Canyon brachiopods are extraordinarily abundant and present an amazing range of variation, but at this locality echinoids are represented by only a few small spines. The fossil-bearing bed in Temescal Canyon consists of coarse sandstone and north of Simi Valley the beds are coarse sandstones and conglomerates. The water that readily percolated through these porous beds quickly dissolved the aragonite shells. Furthermore, the absence of even molds of aragonite-shelled mollusks at most localities indicates that the shells generally were dissolved before the sediments were cemented. Unless some fine-grained sediments are found, there seems to be little hope of obtaining a representative collection from these deposits.